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GROWING FIELD BEANS IN SOUTHERN ALBERTA

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Introduction

The field or shell bean is a relative newcomer to the economy of southern Alberta. This does not imply that it has not been grown and tested for quite some time but rather that it is rapidly gaining importance on a large-scale basis. The potential of field beans as a cash and soil-building crop has been known for years, but the actual expansion and full utilization was not realized until proper seed-handling equipment was introduced. Due to the high standards demanded of the seed trade, acreage expansion had been limited to the amounts of seed that could be hand-picked before disposal. The scope of this circular is confined to the problems of field production of beans under irrigation in southern Alberta.

Soil and Fertilizer Requirements

Field beans are readily grown on a wide variety of soil types, ranging from light sandy to heavy clay loams. The lighter soils usually produce an early crop whereas the heavier soils produce a later crop. Beans thrive best on deep, well drained soils. A sound practice is to grow the bean crop after clover or alfalfa breaking so as to incorporate organic matter into the soil. Beans in a rotation should preferably follow a cultivated crop that produces a more vigorous root system.

Best yields are obtained from fairly fertile soils, as the richest soils have a tendency to produce excessive vines at the expense of seed production. Frequently, outstanding results can be obtained through the application of high-phosphorous fertilizers, and good response to nitrogen can also be expected particularly from an early-seeded crop. Usually these two essential ingredients can be obtained from the same fertilizer mixture. The application of fertilizer requires some care, since contact with the seed will cause serious injury. Fertilizer placed in bands two inches to the side and below the seed gives better results than surface broadcasting. The use of fertilizer is justified for this crop, the rates being dependent upon the place beans have in the over-all rotations of the farm.

The uniformity of slope, i.e., the lay of the land, is important for good bean production, as it encourages good drainage and prevents ponding when irrigating. A flat piece of land is equally as good for proper irrigation. However, bean plants are very susceptible to excessive amounts of water and will not survive if left standing in water for any length of time.

Seed Bed Preparation

Fall irrigation followed by deep ploughing, leaving the land rough, is a necessary preparation for a friable seed bed. The aim of land preparation for beans is to assist in the emergence of the young bean seedling. This can best be achieved by packing the soil before seeding, leaving approximately 1 to 2 inches of fairly loose, moisture-retaining soil on the surface. The bean seed germinates by sending up two large seed leaves, or cotyledons. Since their emergence is hindered by compacted or crusted soil, a relatively loose moist soil is required above the seed.

Seeding the Crop

There are three factors to consider when seeding beans — the condition of the seed, the danger of late-spring frost, and the temperature of the soil. Seed that is cracked, shrivelled, or in any way damaged will not produce full stands of vigorous plants. Therefore, whole, clean, smooth seed should always be used. A vigorous stand of young plants ensures a good crop.

All classes of beans are frost-tender following emergence. Therefore, the date of seeding should be postponed until the danger of serious late-spring frost has passed. Usually this allows seeding to take place in southern Alberta after May 20. However, seeding can be started as early as May 15, weather permitting. Soil temperature must be considered as well. Bean seed fails to germinate adequately below 50° F. and should not be seeded if the soil is below this temperature.

Rate of seeding depends upon the size of seed and spacing of the rows. Six to nine seeds per foot of row is considered adequate and 18 to 36 inches between rows. Grain drills can be used, with every fourth or fifth run open. Also, sugar beet drills or row crop drills can be used to seed beans in rows from 22 inches apart and up. Since many row crops are planted at 22 inches, it seems desirable to seed all row crops at the same distance to maintain a uniform setting for all tillage equipment.

Beans are usually seeded in a firm seed bed to a depth of 1½ to 2 inches allowing the seed to be placed in moist, firm soil. New bean fields should always be inoculated with nitrogen-fixing bacteria of the kind specific for field beans. It is also recommended that the seed be treated with appropriate soil fungicides and wireworm insecticides. Windbreak protection provided by two or three rows of sweet corn or sunflower is suggested for beans spaced 5-8 rods apart.

Care of the Crop

Good seed bed preparation will do much to reduce the number of cultivations necessary to control weed growth. However, if a field is weedy, there are steps that can be taken to reduce the labor required to control weeds. When possible, weed growth should be eliminated before seeding. Before emergence of the beans, dragging a harrow upside down over the field will retard weed growth until the beans become established. Following emergence, row-crop cultivators should be used to kill weeds and to hill up loose soil around the bean plants, thus smothering the weeds in the row. At all times care should be taken to not cultivate too deeply, as the roots of the bean plants are close to the surface. However, a certain amount of furrowing is required to facilitate irrigation. The beans should never be cultivated while the foliage is moist from rain, dew, or irrigation, as certain diseases are spread rapidly through direct or mechanical contact with machinery or clothing. Furthermore, cultivation should be completed by the time the beans are in full bloom, since it will cause the flowers to drop and thus drastically reduce yields.

As a word of caution, weeds such as Russian thistle and wild oats, if allowed to mature, become serious handicaps to good harvesting of beans. Windrowed stands with Russian thistle are subject to blowing away after being cut whereas windrows free from this weed will not blow. Wild oats should be pulled; leaving them to be bladed introduces unnecessary quantities of soil in the windrow.

Irrigating

It was pointed out earlier that fall irrigation is a good practice. Failing this, the bean crop responds to rather rigid irrigation requirements during the growing season. Assuming a moist seed bed is available permitting normal germination, then at least one thorough irrigation will be necessary prior to blooming. Irrigation should not be carried out during the period of full bloom, since any interruption in the growth pattern can cause the blossoms to drop. After blooming is completed, a further medium irrigation (beans are only moderately deep-rooted) may be necessary to stimulate active and uniform pod and seed development.

The furrow system of irrigating beans is preferred to the sprinkler system because it does not wet the foliage. Certain plant diseases are spread readily by splashing. Do not irrigate in the tractor wheel rows. (This means that the furrows will remain intact and thus materially assist in the first harvesting step). Any furrow row that carries water soon silts in and becomes level with the plant row. These are minor points but they become important in successful bean production.

Harvesting

When the beans start to show signs of maturity, it is necessary to cut the plants below ground level and windrow them for drying and combining. A poor job of blading and combining can completely offset all other care exercised prior to harvest. Bean plants do not mature uniformly, either as individuals or collectively. However, when most of the pods have started to turn yellow it is time to start blading. As a general rule bean seeds that have started to turn their characteristic color in the pod will mature in a normal fashion regardless of pod color. Do not delay harvesting beyond this point; otherwise shelling may occur in the windrow while the plants are drying. The degree of maturity of each individual field will dictate to the grower when he should start to harvest.

The dry atmosphere prevalent in southern Alberta will cause bean seeds to dry out rapidly. Excessive drying causes either hard seed coats, which will not imbibe moisture when beans are being used for processing, or severe cracking of the seed coats. Cracked seeds are of little value to anyone. Therefore, it is imperative that beans should not become too dry. To safeguard against this it may be necessary to combine the windrowed beans when they are slightly tough, for example, in the early morning or following a light rain shower.

Special equipment is required to harvest and combine beans. Blades for cutting the plants vary in design but basically do the same thing. They should be properly mounted on the tractors and adjusted according to the manufacturer's directions. Sharp blades are capable of doing a more efficient job and thus cause less damage to the plants.

Raking and windrowing before combining should be done in the early morning or when the bean plants are damp, i.e., about 4 days after cutting. This will facilitate a more efficient harvest. Bean harvester combines are available on the market. Regular grain combines can be adapted to pick up and thresh the windrowed beans. The usual practice is to reduce the cylinder speed, remove some of the teeth from the concave, and leave the remaining parts of the machine to operate at normal speeds. Cylinder speeds should be regulated from time to time to do the best job. In the early morning, when moisture content is high, the cylinder speed should be greater than would be necessary in the afternoon, when the moisture content is lower. If the threshed seeds are augered into the storage bin or truck it is important that all augers and conveyors be in first-class condition to reduce seed cracking.

Varieties

There are many different kinds of field beans available. However, the climatic conditions of southern Alberta limit the length of season required by any given variety. Three classes are currently of interest, the navy or pea bean, preferred by processors for beans with pork; the Great Northern; and the colored types such as Red Mexican and Pinto, which are somewhat larger; these latter types are preferred by the package trade.

Navy beans (small, white)

Sanilac — a relatively new variety, readily matures in southern Alberta, is determinate (non-vining plant habit) in plant growth, intermediate in yield (700 - 1100 pounds per acre), and susceptible to halo blight.

Burbank — an old variety in southern Alberta, comparable to Sanilac in maturity, is indeterminate (vining plant habit) in plant growth, intermediate in yield (700 - 1200 pounds per acre), susceptible to halo blight, and has excellent quality.

Monroe — a newcomer to the area, earlier-maturing than Burbank, somewhat intermediate between Sanilac and Burbank in plant growth, heavy-yielding (800 - 1500 pounds per acre), and somewhat susceptible to halo blight.

New varieties of navy beans are being continually tested by the Research Station at Lethbridge and anything that looks promising is turned over to the growers. A pea bean-breeding project is under way to develop disease-resistant, early-maturing, high-yielding varieties with the determinate plant habit.

Great Northern Types (large, white)

There are many different strains of Great Northern beans. In general, they are readily grown within the limitations of the season. All are heavier-yielding than the small whites (1100 - 1800 pounds per acre) and some strains are resistant to halo blight. However, the availability of seed of blight-resistant strains will determine the extensiveness to which they can be grown.

Diseases

Although there are many diseases of field beans, only three are of major importance in southern Alberta. These are the bacterial blights (halo and common) and anthracnose. They are discussed in order below.

The symptoms of bacterial blights appear first as small water-soaked spots on the leaves usually surrounded by a yellowish zone or halo, which increases rapidly in size up to one-half inch. Later this yellowish zone dries out leaving a brownish, irregularly shaped spot. Water-soaked areas also occur on the pods, turning reddish with age. Diseased seeds show various degrees of shrivelling and discoloration depending upon the severity of infection.

The bacterial blights are initially spread from infected seed. Warm wet weather greatly assists the spread of these diseases. Plants grown from infected seed are sources of further spreading of the disease to healthy plants. Continued spread from the original diseased plant is carried out by sprinkler water, wind-borne rain, dust, implements, man, and animals. Under favorable conditions spread of the disease can be rapid.

To control bacterial blights, use disease-free seed produced in disease-free areas. Secondly, all cultivation and other traversing of bean fields, including sprinkler irrigation, should be held to a minimum to reduce the chances of mechanical spread of the diseases. Thirdly, as the disease survives over winter in bean plant residue, use crop rotations as another method of combatting the disease.

The symptoms of anthracnose appear as dark-brown angular spots on the leaves, stems, and pods of beans. On pods the spots usually have a light-brown margin and may attain a size of one-fourth inch. Under moist conditions the centres of these spots become fuzzy and pink-coloured.

Seed and infected plant material carry anthracnose from one year to the next. Spread of the disease during the growing season is from infected plants to healthy ones by rain, irrigation water, and cultivation implements. Cool moist weather is necessary for rapid development of anthracnose, and for that reason this disease is not important in most years in southern Alberta.

As with the bacterial blights the use of disease-free seed and the planting of beans in land that has not been planted to beans the previous years are the best means of avoiding early infections of anthracnose. To reduce spread of this disease during the growing season avoid cultivating when the leaves are moist.

